PXIE CAD Model: Status, Responsibilities and Plan Forward

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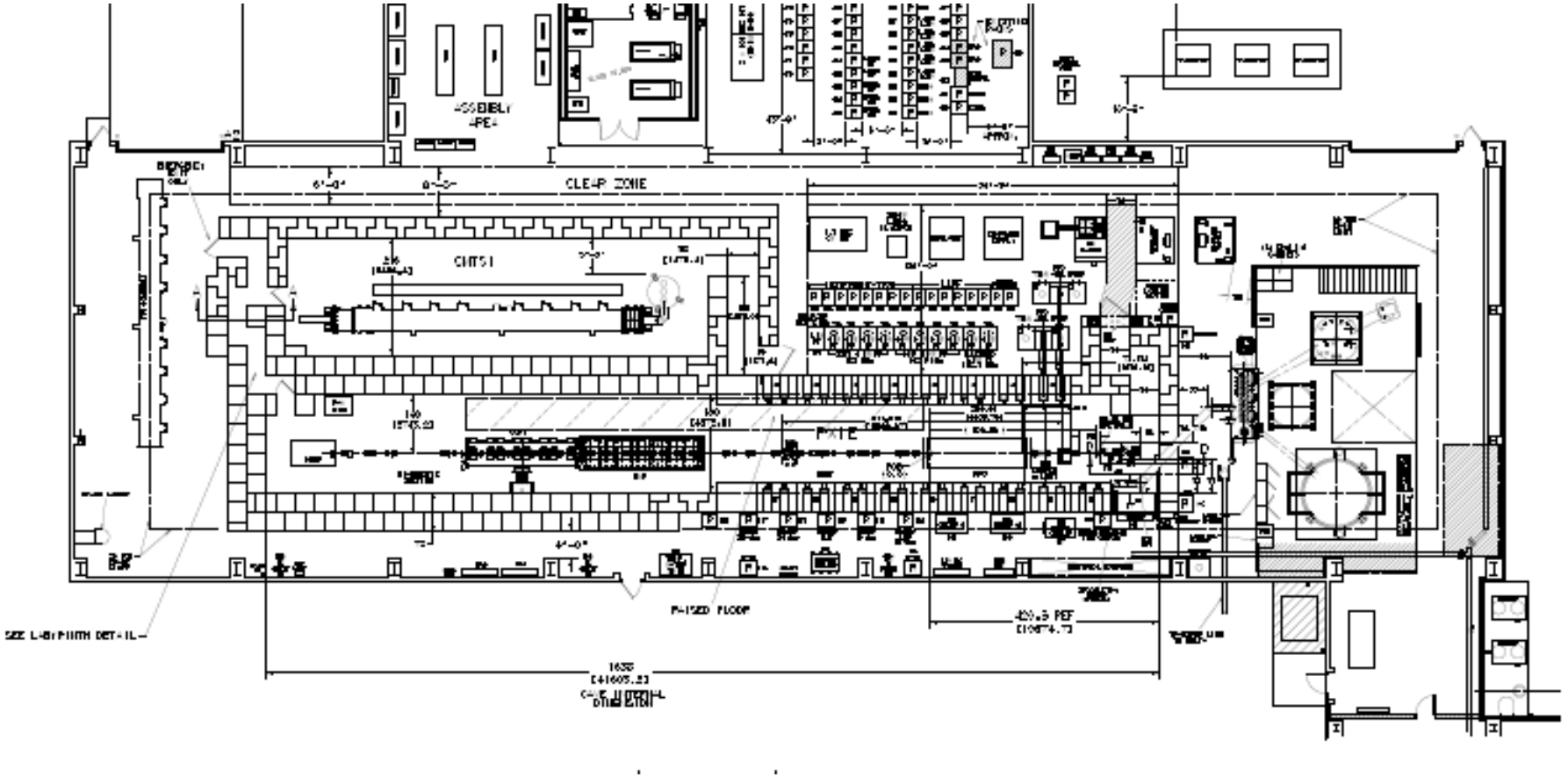
Project X Doc DB: **Project X-doc-1243**

Background: CAD System Transition

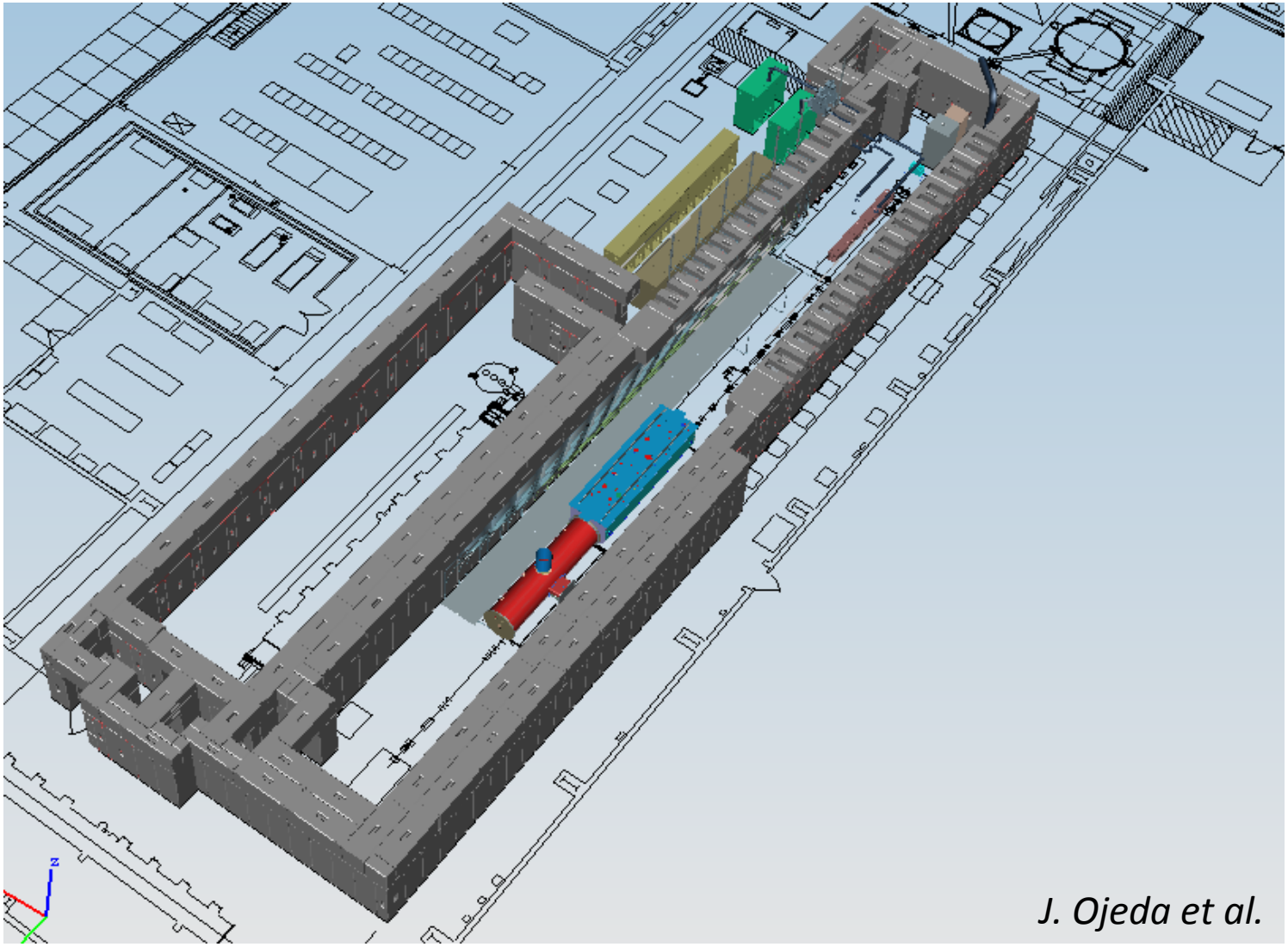
- The lab is transitioning from the IDEAS CAD system to the NX/Teamcenter system
  - NX is the design and drafting program
  - Teamcenter is a data management system, with broader uses beyond CAD
- Transition has been ongoing for quite some time
- The transition must finish soon due to security vulnerabilities associated with running IDEAS on Windows XP
- PXIE data currently exists in both systems

PXIE in IDEAS
CMTF layout



S. Wesseln

PXIE in NX/Teamcenter Work-In-Process 3D Model



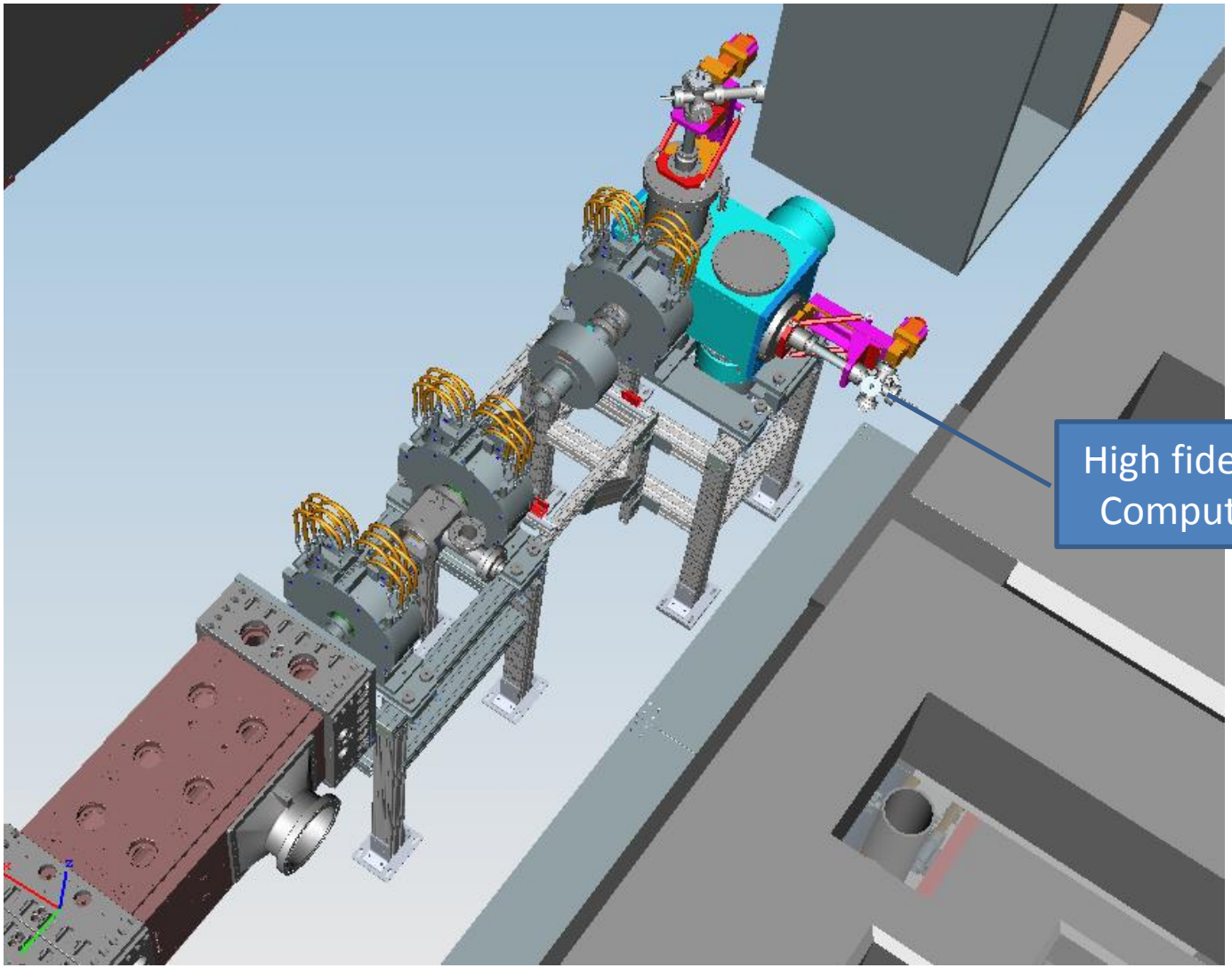
J. Ojeda et al.

NX CAD Model Issues

- Many subsystems are not yet represented
  - As a consequence, we are vulnerable to interference issues
- Models from other CAD systems will continue to be provided by collaborators
- Mature systems (e.g. the LEBT) are shown in great detail
  - This gives rise to computational issues when loading higher-level assemblies
  - This is a good kind of problem to have…

PXIE in NX/Teamcenter Work-In-Process 3D Model

Project X



Planned Approach

Project X

1. Organize structure of top-level NX CAD model to reflect responsibility (create and follow a drawing tree)
2. Use *existing* design resources to create simple representations and envelopes for each PXIE subsystem
3. Work from the more-complete model
   - Update key layout drawings in NX
   - Continue with subsystem design

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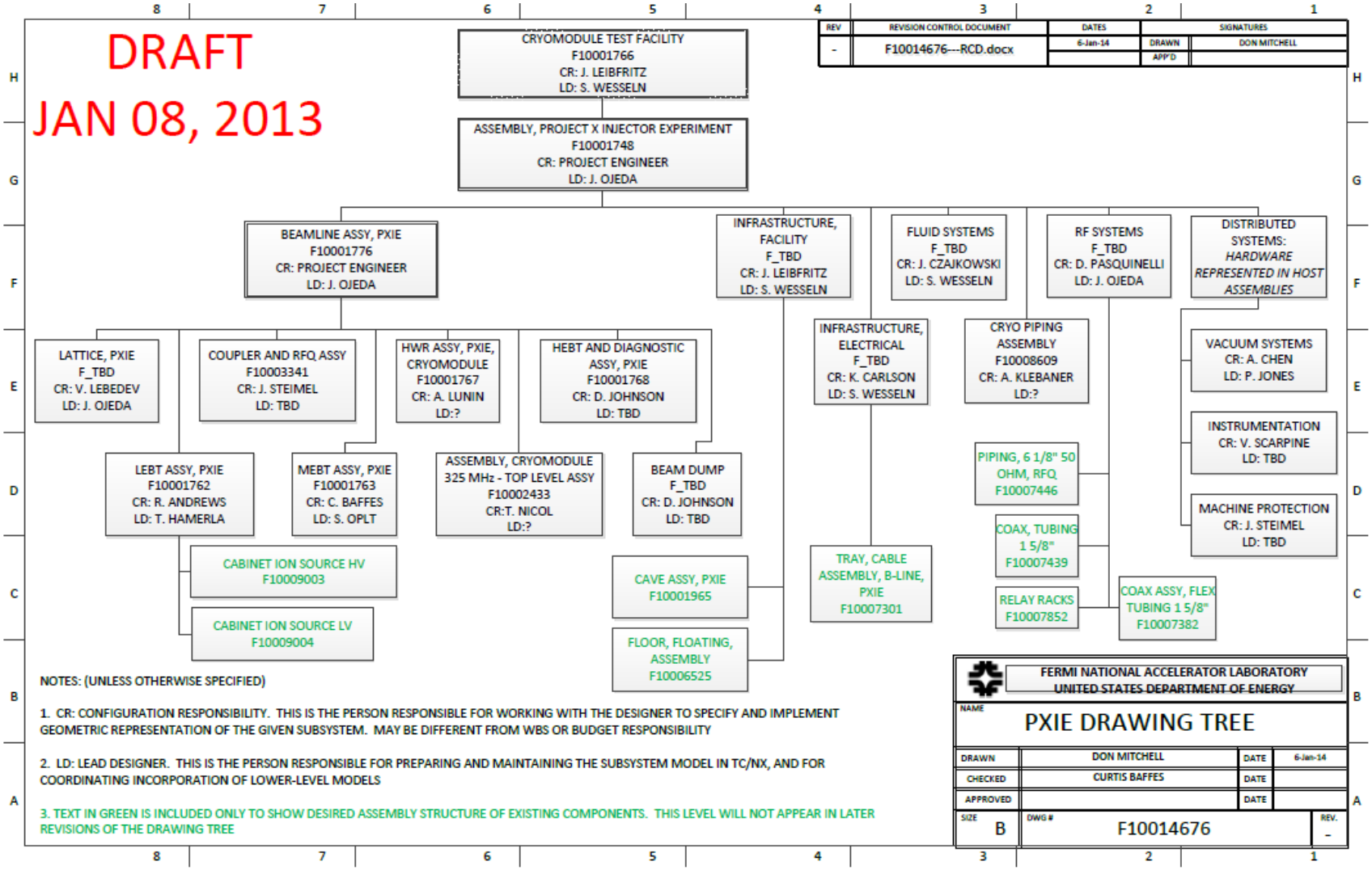
Drawing Tree



Drawing Tree

Project X

- The Drawing Tree:
  - Defines desired top-level assembly structure
  - Identifies current designer responsibility
  - Identifies current “Configuration Responsibility”
- The people identified in the tree are responsible for generating/managing CAD data lower level subsystems
- This file will be circulated for review. Please let me know if:
  - You find errors and omissions
  - You think your subsystem belongs at a different level of the PXIE model

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3D Model Data

We need to develop:

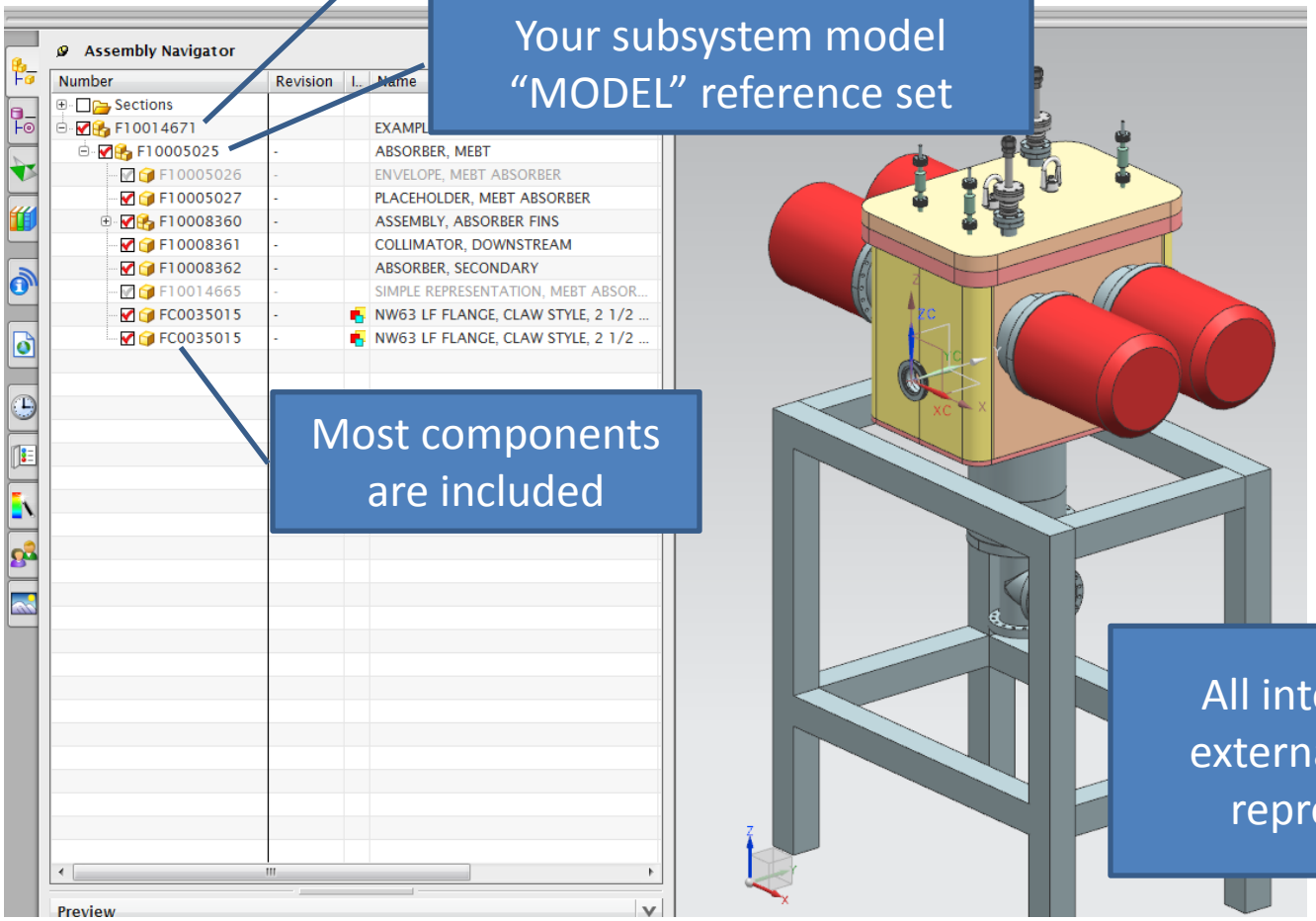
- "MODEL" representations
  - The high-fidelity detailed design
  - Used to create subassembly and part drawings
- "SIMPLE" representations
  - Something that is pictorially the correct size and shape
  - To be used at for efficient viewing of higher levels of assembly
- "ENVELOPE" representations
  - A not-to-exceed volume that a subassembly lives within

MODEL Reference Set Example

Project X

A higher-level assembly

Your subsystem model "MODEL" reference set



Most components are included

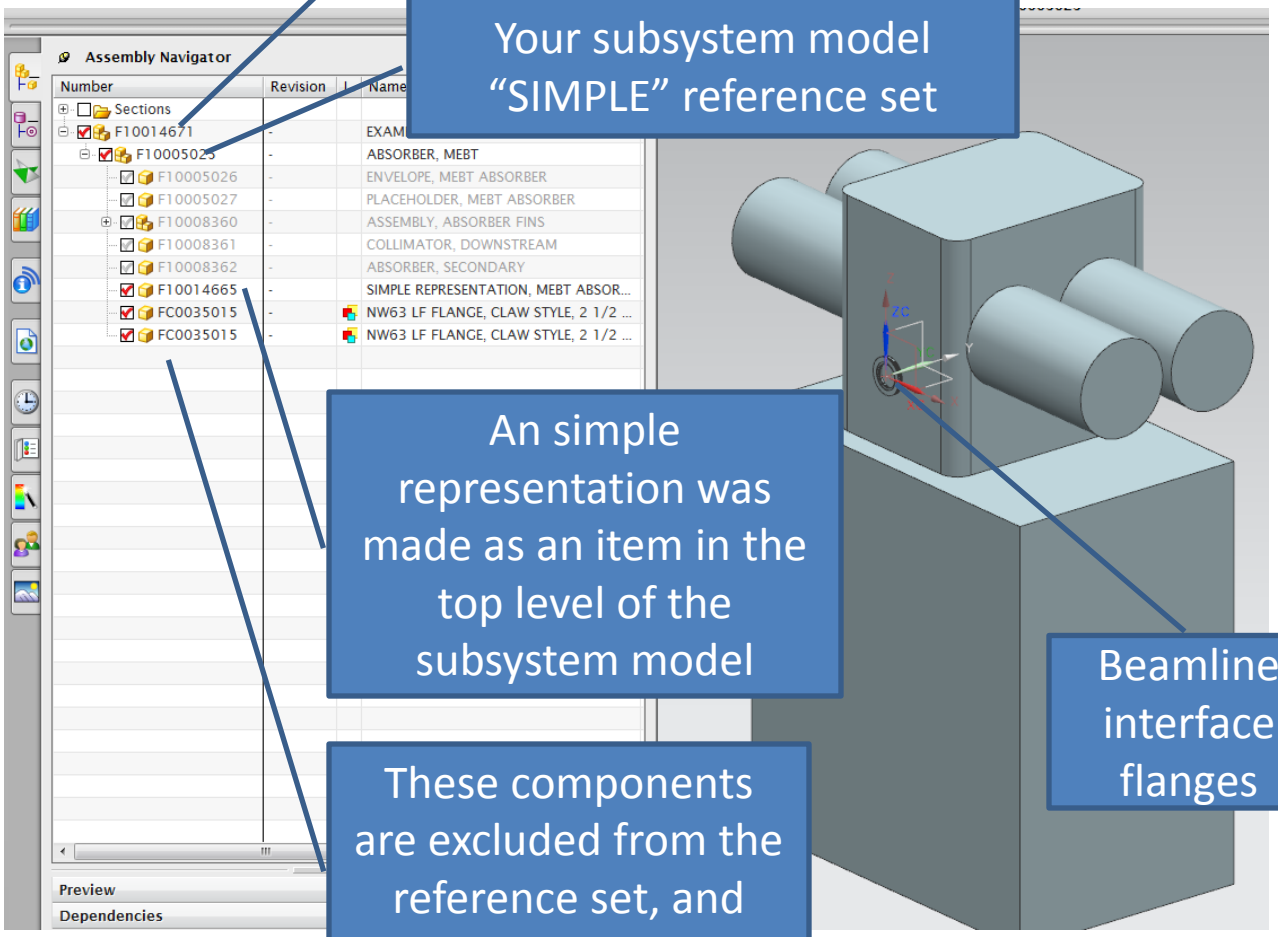
All internal and external detail is represented

SIMPLE Reference Set Example

Project X

A higher-level assembly

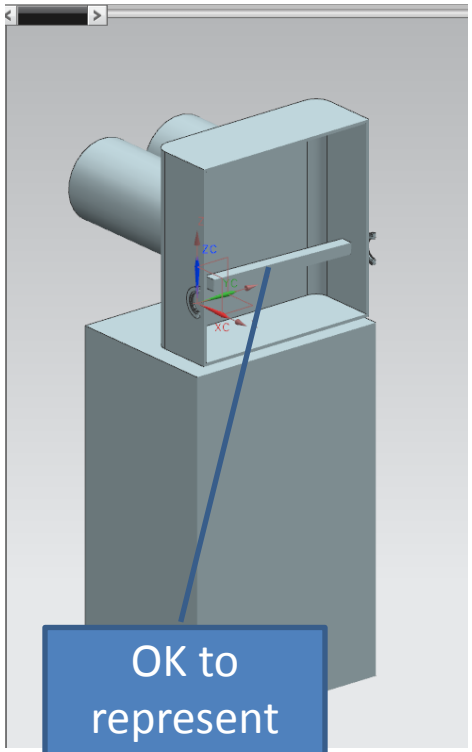
Your subsystem model "SIMPLE" reference set



An simple representation was made as an item in the top level of the subsystem model

These components are excluded from the reference set, and won't be loaded

Beamline interface flanges



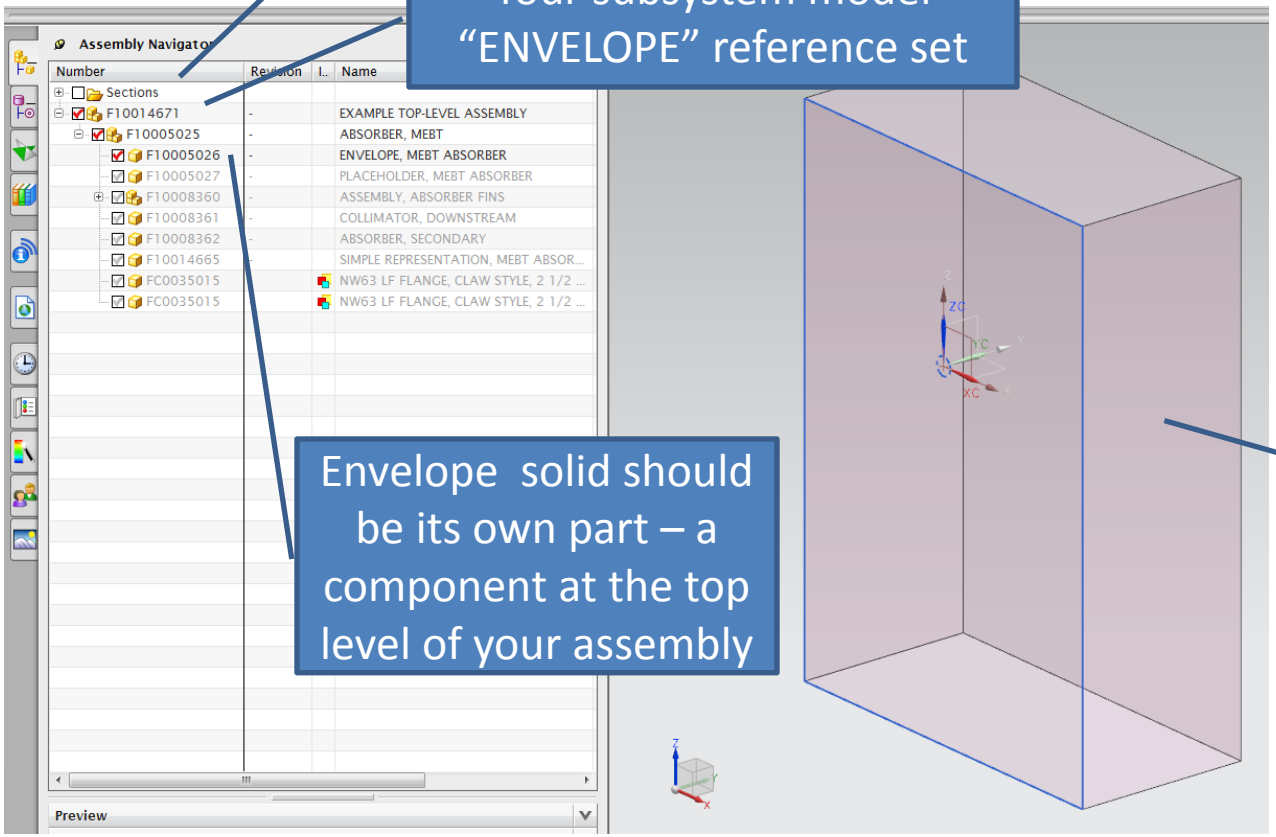
OK to represent key internal details

ENVELOPE Reference Set Example

Project X

A higher-level assembly

Your subsystem model "ENVELOPE" reference set



Envelope solid should be its own part – a component at the top level of your assembly

Not-to-exceed volume

Data Management

- CAD data will need to be managed using “Reference Sets” and “Arrangements” functions
- A description of the desired modeling practices is being generated by Jeff Ojeda and Don Mitchell
- Once this description is available, a meeting will be called with the relevant stakeholders (folks on the drawing tree) to explain these practices and begin implementation

Near Term Work:
Generating SIMPLE Representations

Project X

- Designers already working on PXIE will be called upon to generate SIMPLE representations of key components

- Persons with “Configuration Responsibility” will be asked to provide volume definition
  - This could be as simple as a pencil sketch

Final design

What we need now

Planned Approach

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Timetable

1. Finalize Drawing Tree, reorganize PXIE CAD model to reflect the same structure – *the next few weeks*
2. Create SIMPLE Representations:
   - Define practices – *by early February*
   - Simple representation of beamline assy – *early March*
   - Simple representations of infrastructure – *~April*
3. Work from the more-complete model
   - Update key layout drawings in NX – *begin late February*
   - Continue with subsystem design - *ongoing*